INDEX TO VOLUME 13

Aggregation of preferences, different approaches to, 245
Arora, P. N., 345

Banerji, R. B., 299
Bennett, T. J. A., 201
Binary system, repair cost in, 219

Caianiello, E. R., 187
Chowdhary, S., 345
Computer chess, 31
Cybernetic model of team formation in soccer, 311
Czogala, E., 275

de Santis, F., 77
Di Giulio, E., 187
Dopaminergic synapse, mathematical model of, 257

Evolutionary management, 153

Factor analysis and Fisher's linear discriminant analysis, 77
Favella, L., 95
Findler, N. V., 25
First passage time problems, 95
Fuzzy rules generation for fuzzy control, 275

Huska, A. M., 311

Jakubowski, R., 1

Kentucky longevity information system, 129
Knowledge, thermodynamic theory of, 213

Language as a self-organizing system, 201
Lee-scheme and bounds for Lee-codes, 331
Linguistic hedges, 357

Malik, F., 153
Mattessich, R., 51
Mende, W., 175
Mergenthaler, W., 219

Nervous system, energetics versus communication in, 187

Pagliuca, A., 77
Pedrycz, W., 275
Pernici, B., 31
Peschel, M., 175
Porenta, G., 257

Probst, G. J. B., 153
Production systems, multi-level learning technique using, 25

Reddy, N. P., 213
Reineri, M. T., 95
Ricciardi, L. M., 95
Riederer, P., 257
Rödding, W., 245

Sacerdote, L., 95
Shannon's entropy and cyclicity, 345
Sprague-Grundy function in graphs with decomposable nodes, 299
Syntactic characterization of machine parts shapes, 1
Systems analysis, ecological approach to, 175
Systems framework, axiomatic representation of, 51

Tussey, C. C., III, 129

Wolf, D. J., 129

Yager, R. R., 357
Yu, Y. K., 299

Cybernetics and Systems

An International Journal

Formerly JOURNAL OF CYBERNETICS

VOLUME 13 1982

hemisphere publishing corporation
published in cooperation with
the austrian society for cybernetic studies, vienna

CYSYDH
ISSN: 0196-9722

Cybernetics and Systems

An International Journal

EDITOR ROBERT TRAPPL Department of Medical Cybernetics, University of Vienna Medical School, Freyung 6, A-1010 Vienna, Austria (*Medicine*)

EDITORIAL ASSISTANT: Annemarie Yodzis

ASSOCIATE EDITORS

HENRI ATLAN Department of Medical Biophysics, Hadassah Medical School, P.O. 1172, Jerusalem, Israel (*Information Theory*)
DONALD C. GAUSE Department of Systems Science, SUNY at Binghamton, Binghamton, NY 13901 U.S.A. (*Adaptive Systems*)
F. de P. HANIKA Haus Hanika, A-8524 Bad Gams 92, Austria (*Management and Organization, plus Book Reviews*)
GEORGE J. KLIR Department of Systems Science, SUNY at Binghamton, Binghamton, NY 13901 U.S.A. (*General Systems*)
ELISABETH LEINFELLNER 839 South 15th, Lincoln, Neb. 68508 U.S.A. (*Linguistics*)
MARIA NOWAKOWSKA 7400 Bissonnet, 1414-2, Houston, TX 77074 U.S.A. (*Social Processes*)
GORDON PASK 61 Kings Road, Kingston-upon-Thames, Surrey KT2 5JA, England (*Cognition and Learning*)
JUDEA PEARL Engineering Systems Department, UCLA, Los Angeles, Calif. 90024 U.S.A.
FRANZ PICHLER Department of Statistics and Computer Science, University of Linz, A-4045 Linz, Austria (*Engineering*)
LUIGI M. RICCIARDI Department of Mathematics, The University of Naples, Via Mezzocannone 8, 80134 Naples, Italy (*Biomathematics*)
BERNARD P. ZEIGLER Department of Applied Mathematics, The Weizmann Institute of Science, P.O. 26, Rehovot, Israel (*Simulation*)

INTERNATIONAL CYBERNETICS NEWSLETTER
Edited by the Austrian Society for Cybernetic Studies (ÖSGK), Vienna. **F. de P. HANIKA,** Editor, International Contacts Secretariat (ÖSGK), Haus Hanika, A-8524 Bad Gams 92, Austria

EDITORIAL ADVISORY BOARD: JOHN M. RICHARDSON (Chairman), Thousand Oaks, California; **MICHAEL A. ARBIB,** Amherst, Massachusetts; **STAFFORD BEER,** Manchester, England; **JULIAN H. BIGELOW,** Princeton, New Jersey; **GEORGE BUGLIARELLO,** New York, New York; **MYRON A. COLER,** New York, New York; **THOMAS G. EVANS,** Bedford, Massachusetts; **KUNG-SUN FU,** Lafayette, Indiana; **CARL HAMMER,** Washington, D.C.; **ROBERT E. KALABA,** Los Angeles, California; **LAVEEN N. KANAL,** Silver Spring, Maryland; **DEMETRIOS LAINIOTIS,** Buffalo, New York; **JOHN H. LYMAN,** Los Angeles, California; **MELVIN E. MARON,** Berkeley, California; **JAMES G. MILLER,** Santa Barbara, California; **ANTHONY N. MUCCIARDI,** McLean, Virginia; **V. K. MURTHY,** Santa Monica, California; **OTTO SCHMIDT,** Minneapolis, Minnesota; **LOUIS L. SUTRO,** Cambridge, Massachusetts; **MORTON TEICHER,** New York, New York; **LOFTI A. ZADEH,** Berkeley, California.

PUBLISHER **HEMISPHERE PUBLISHING CORPORATION**
1025 Vermont Avenue, N.W., Washington, D.C. 20005, Phone (202) 783-3958
Cybernetics and Systems is owned by Hemisphere Publishing Corporation
EDITORIAL STAFF: Louis M. Fancher, *Editorial Director;* Christine R. Flint, *Managing Editor.*
ADVERTISING REPRESENTATIVE: Mrs. Leni Ellinger, 3133 Connecticut Avenue, N.W., Washington, D.C. 20008. Phone (202) 232-3366.
SUBSCRIPTION RATES (Four issues per volume per year): U.S. and Canada, $85.00; elsewhere, $93.00. Single copies, $27.50.
SUBSCRIPTION SERVICE: Shipments will be made only upon receipt of remittance. All orders, remittances, and communications related to handling subscriptions, including notifications of change of address, should be sent to Kathleen A. Roach, Subscriptions Manager, c/o publisher. Change of address notices should provide the old as well as the new address, including zip code number. Changes will become effective within approximately 20 days. Missing copies will be replaced only if valid claims are received within 90 days from date of mailing. Replacements will not be allowed if the subscriber fails to notify the publisher of a change of address or if a copy is misplaced at destination. Request for refund will be honored only prior to delivery of issue number 1 of each volume.

Copyright © 1982 by Hemisphere Publishing Corporation. All rights reserved. Printed in the United States of America. The appearance of the code at the bottom of the first page of an article in this journal indicates Hemisphere's consent that copies of the article may be made for personal or internal use. This consent is given on the condition, however, that the copier pay the stated per-copy fee through the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, for copying beyond that permitted by Sections 107 and 108 of the U.S. Copyright Law. For pre-1978 articles the per-article copying fee is $4.00.

CYBERNETICS AND SYSTEMS: An International Journal (ISSN 0196-9722) is published quarterly for $85.00 per year by Hemisphere Publishing Corporation, 1025 Vermont Ave., N.W., Washington, D.C. 20005. Second-class postage rates is paid at Washington, D.C. and additional mailing offices. POSTMASTER: Send address changes to CYBERNETICS AND SYSTEMS: An International Journal, 1025 Vermont Ave., N.W., Suite 1000, Washington, D.C. 20005.

CONTENTS OF VOLUME 13

NUMBER 1

1 SYNTACTIC CHARACTERIZATION OF MACHINE PARTS SHAPES
Ryszard Jakubowski

25 A MULTI-LEVEL LEARNING TECHNIQUE USING PRODUCTION SYSTEMS
Nicholas V. Findler

31 PROBLEM SOLVING IN GAME PLAYING: COMPUTER CHESS
Barbara Pernici

51 AXIOMATIC REPRESENTATION OF THE SYSTEMS FRAMEWORK: SIMILARITIES AND DIFFERENCES BETWEEN MARIO BUNGE'S WORLD OF SYSTEMS AND MY OWN SYSTEMS METHODOLOGY
Richard Mattessich

77 ON FACTOR ANALYSIS AND FISHER'S LINEAR DISCRIMINANT ANALYSIS
Filomena de Santis and Alfonso Pagliuca

93 BOOK REVIEW

FOLLOWING PAGE 94:

- **INTERNATIONAL CYBERNETICS NEWSLETTER, TWENTY-THIRD QUARTERLY ISSUE**

NUMBER 2

95 FIRST PASSAGE TIME PROBLEMS AND SOME RELATED COMPUTATIONAL METHODS
L. Favella, M. T. Reineri, L. M. Ricciardi, and L. Sacerdote

129 THE KENTUCKY LONGEVITY INFORMATION SYSTEM (K.L.I.S.)
C. C. Tussey, III and David J. Wolf

153 EVOLUTIONARY MANAGEMENT
Fredmund Malik and Gilbert J. B. Probst

175 ECOLOGICAL APPROACH TO SYSTEMS ANALYSIS BASED ON VOLTERRA EQUATIONS
Manfred Peschel and Werner Mende

187 ENERGETICS VERSUS COMMUNICATION IN THE NERVOUS SYSTEM
Eduardo R. Caianiello and Enzo Di Giulio

197 BOOK REVIEW

199 ERRATA

FOLLOWING PAGE 199:

- **INTERNATIONAL CYBERNETICS NEWSLETTER, TWENTY-FOURTH QUARTERLY ISSUE**

NUMBER 3

201 LANGUAGE AS A SELF-ORGANIZING SYSTEM
T. John A. Bennett

213 A THERMODYNAMIC THEORY OF KNOWLEDGE
Narender P. Reddy

219 THE TOTAL REPAIR COST IN A DEFECTIVE, COHERENT BINARY SYSTEM
Wolfgang Mergenthaler

245 DIFFERENT APPROACHES TO THE AGGREGATION OF PREFERENCES
Walburga Rödding

257 A MATHEMATICAL MODEL OF THE DOPAMINERGIC SYNAPSE: STABILITY AND SENSITIVITY ANALYSES, AND SIMULATION OF PARKINSON'S DISEASE AND AGING PROCESSES
G. Porenta and P. Riederer

275 FUZZY RULES GENERATION FOR FUZZY CONTROL
E. Czogala and W. Pedrycz

295 BOOK REVIEW

FOLLOWING PAGE 297:

- **INTERNATIONAL CYBERNETICS NEWSLETTER, TWENTY-FIFTH QUARTERLY ISSUE**

NUMBER 4

299 PERIODICITY OF SPRAGUE-GRUNDY FUNCTION IN GRAPHS WITH DECOMPOSABLE NODES
Y. K. Yu and R. B. Banerji

311 THE PROPOSAL OF CYBERNETIC MODEL OF A TOP TEAM FORMATION IN SOCCER
Augustín Marián Huska

331 THE LEE-SCHEME AND BOUNDS FOR LEE-CODES
Jaakko Astola

345 SHANNON'S ENTROPY AND CYCLICITY
P. N. Arora and Subhash Chowdhary

357 LINGUISTIC HEDGES: THEIR RELATION TO CONTEXT AND THEIR EXPERIMENTAL REALIZATION
Ronald R. Yager

FOLLOWING PAGE 374:

- **INTERNATIONAL CYBERNETICS NEWSLETTER, TWENTY-SIXTH QUARTERLY ISSUE**

- **TITLE PAGE TO VOLUME 13**
  CONTENTS OF VOLUME 13
  INDEX TO VOLUME 13